NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RANGE PLANTING (ACRE)

CODE 550

DEFINITION

Establishment of adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees.

PURPOSES

This practice may be applied as part of a resource management system to accomplish one or more of the following purposes:

- Restore a plant community similar to its historic climax or the desired **native** plant community.
- Provide or improve forages for livestock.
- Provide or improve forage, browse or cover for wildlife.
- Reduce erosion by wind and/or water.
- Improve water quality and quantity.

CONDITIONS WHERE PRACTICE APPLIES

On rangeland, native or naturalized pasture, grazed forest, or other suitable locations where the principal method of vegetation management will be by grazing. This practice shall be applied where **indigenous vegetation is determined to be degraded to the point that natural reseeding of desirable species cannot occur;** on disturbed sites, or where the potential for enhancement of the vegetation by grazing management alone is unsatisfactory.

On pastureland or cropland where the primary purpose is to convert the land use to native vegetation.

CRITERIA

General Criteria Applicable To All Purposes Named Above

SPECIES SELECTION

Plant species and their cultivars shall be selected based upon the appropriate rangeland ecological site(s) and soils and climatic characteristics of the site. Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures–contains species recommendations and seeding rates based on ecological sites within specific Major Land Resource Areas and Rangeland Resource Units. Seeding rates listed have been determined to provide the best response in a native seed mixture and may vary from other recommendations given for single species plantings—such as Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications, 512–Pasture and Hayland Planting.

Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures–lists the recommended upper limits for plant species percentages in a mixture. These guidelines should be used to assist in developing a seeding mixture which is representative of the species composition of the historic native plant community, while meeting other purposes as well. The percentages in Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures–may vary from those lists in the FOTG, Section IIE8–

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Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard contact the Natural Resources Conservation Service.

NOTE: This type of font **(AaBbCcDdEe 123..)** indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123..) indicates Montana Supplement.

Rangeland Ecological Site Descriptions, which must be used when developing a planting under FOTG, Section IV, Practice Standards and Specifications, 643–Restoration and Management of Declining Habitats.

Other guidelines for choosing the appropriate seeding mixture should include:

- **Desired plant characteristics relative to the site and producer's objectives including one or more of the following: forage quality and quantity, drought tolerance, wildlife cover, regrowth ability, relative stand life, rooting, and soil protection characteristics.**

All seedings will contain a minimum of three species unless otherwise specified. If two or more ecological sites are seeded together, the species mixture can be tailored to match multiple sites, as long as the chosen species meet specifications and the recommended percentage guidelines are followed.

The selection of species for any grass, forb, or shrub seeding will meet the following requirements:

1. **Species will be adapted to the site (soil and climatic factors). Refer to FOTG, Section IIE8–Rangeland Ecological Site Descriptions, Historic Climax Plant Community, and Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures. Reference *Montana Interagency Plant Materials Handbook* for information regarding plant characteristics, adaptation and management.**

2. **All seed and planting materials shall be labeled and will comply with current Federal and Montana standards. See FOTG, Section I–State/Local Laws for the Montana Agricultural Seed Act and Administrative Rules, State of Montana Department of Agriculture.**

3. **Use certified seed and recommended cultivars whenever available. See Montana Conservation Practice Specification 550–TABLE 2–Recommended Cultivars for Montana Range Plantings. When certified seed is not available, common seed may be used that is adapted to local soil and climatic conditions. Seed should not be used if the origin or cultivar is unknown.**

   A rule of thumb is that plantings of native species can be made with seed harvested from native stands in Montana or adjacent states and provinces within a geographic range of 300 miles north or 500 miles south of the planting site. The east-west range is determined by similar elevation and precipitation.

4. **All seed must be tested and tagged in accordance with all federal and Montana Agricultural Seed Act and Administrative Rules.**

   CAUTION: Seed tests must be performed and dated within one year prior to the date of planting. See FOTG, Section I–State/Local Laws, Ordinances, and Regulations.

   The germination and purity of each species in a mixture must be listed on the seed tag, as well as the percentage of each species in the mixture, to verify adequate amounts of Pure Live Seed (PLS).

   CAUTION: It is recommended to obtain separate seed tags for each species, as the percentage of weed and other crop seeds will be shown on the label. These are often not clearly identified on a seed tag for a mixture.

SEEDBED PREPARATION

When a conventional seedbed is prepared, competing vegetation will be controlled and the site will not be subject to erosion. A firm pulverized seedbed ensures seed to soil contact will be provided. A firm seedbed facilitates the capillary movement of moisture to the seed and developing seedling. A good rule of thumb is that a footprint will be no deeper than 1/4-inch in an ideal seedbed.

The presence of weed populations—especially noxious weeds—will impact seedbed preparations. Each field should be evaluated for weed populations. Seeding on fields with significant weed populations will be delayed until weeds are controlled mechanically or chemically with labeled herbicides. Refer to guidelines in FOTG, Section IV, Practice Standards and Specifications, 595–Pest Management, and *Montana, Utah, Wyoming Weed Management Handbook.* During this period a protective cover crop may need to be planted to control erosion prior to planting.

When planning a seeding, the previous several years of herbicide application must be considered. Any potential carryover problems must be addressed by delaying seeding, establishing a cover crop, and/or changing species to be planted. If a cover crop is necessary, refer to guidelines in FOTG, Section IV, Practice Standards and Specifications, 512–Pasture and Hayland Planting.

Seeding of depleted range and/or pastureland, or cropland fields will require control of existing perennial and annual vegetation. This may be accomplished through chemical or mechanical methods. If tillage is used, a minimum of two years of cultivation and cropping is recommended to control existing vegetation and to store soil moisture. Standing cereal grain stubble provides an excellent seedbed if proper seeding equipment is used.

If chemical methods are used, multiple applications are generally required to achieve satisfactory control of perennial competition. Litter may need to be reduced to allow for proper seed placement and good seed-to-soil contact.

The type of grass seeding equipment available will strongly influence the options for seedbed preparation. If seeding into standing stubble or crop residue a double disk, furrow drill, or no-till drill with coulters will be required to achieve proper seed placement.

FERTILIZER

The application of nitrogen is <u>not</u> usually required for grass/legume establishment. However, if soil test results show that nitrogen levels are low or very low (below 10 ppm), light rates of available nitrogen may be incorporated during site preparation or applied with the seed at planting—maximum of 15 pounds actual N.

Native species do not generally respond well to fertilizer applications under dryland conditions. Phosphorus, potassium, and sulfur applications will be based on soil test results. See FOTG, Section IV– Practice Standards and Specifications, 590–Nutrient Management, and *Fertilizer Guides for Montana*.

SEEDING RATES AND MIXTURES

1. **Seeding rates will be calculated on a pure live seed (PLS) basis.**

2. **Use Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures–to determine pounds of pure live seed (PLS) required for a pure stand.**

3. **For calculating mixtures of three or more species, determine the total pounds of PLS required by multiplying the full seeding rate of each species by the percentage desired within the total mixture. See Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures) Use the Range Planting Specification for step by step guidance.**

4. **Seeding rates of plus or minus 10 percent of the recommended rate (on a PLS basis) will be considered as meeting this standard.**

5. **Native grass mixtures generally consist of a variety of seed sizes, shapes, and textures that will result in a uniform flow through the seed box. Rice hulls or other carriers are usually only required for adequate flow through the drill box when small, light dictates treatment necessary. Fungicide recommendations must adhere to all manufacturers' label directions and precautions for treatment and, fluffy, or winged seeds (blue grama, big bluestem, sideoats grama) are planted alone, or in high percentages (greater than 50 percent).**

   An agitator is very useful to assist in seed flow when seeding native grasses. In seed drills that do not have an agitator, watch for settling of the smaller and heavier species.

SEED TREATMENT

1. **Many species of grasses are attacked by soil-borne fungi that reduce emergence and vigor. Seed may be treated before planting with an appropriate fungicide if past experience or field history handling of seed.**

2. Legume seed shall be inoculated with the proper, viable symbiotic rhizobia before planting.

   CAUTION: Select inoculates that have been stored in a cool, dry environment. Do not use inoculates after the expiration date indicated on the container.

TIME OF SEEDING

1. Spring seedings will be completed by May 15.

   Best time for cool season species, second best period for planting warm season species.

2. Seedings will be made after May 15 only when there is a minimum of two feet of moist soil. The soil must also be moist to within two inches of the surface. These seedlings must be completed by August 1st.

   Best period for planting warm season species is May 15 through June 15, if there is adequate soil moisture.

3. Dormant fall seedings can be made after October 15 or when the soil temperature at two inches below the soil surface remains at 40° F for ten days or more.

   Warm season species are not generally recommended for dormant seeding—except switchgrass.

4. Species with dormant seed such as green needlegrass and Indian ricegrass must be planted as a dormant fall seeding unless germination by standard seed test is greater than 50 percent. Spring seeding is acceptable if dormant species are a minor component of a mixture—less than 50 percent.

PREPARATORY COVER CROP

Cover Crops. In general, seeding cover crops with perennial grasses or forbs is not recommended as they provide too much competition for seedlings and will typically reduce the subsequent seedling and stand establishment and forage yield, particularly when moisture is limiting. However, under eroding conditions, in heavy clay soils prone to crusting, or in higher precipitation areas, they can be successfully used.

Decrease the cover crop seeding rate to a maximum of 15 PLS pounds per acre and seed the crops at right angles or in alternate rows to reduce competition. If a cover crop is necessary, refer to guidelines in FOTG, Section IV–Practices Standards and Specifications, 512–Pasture and Hayland Planting.

SEEDING METHODS

1. Planting. Seeding will be done with a drill or air seeder that will place the seed at the proper depth, provide a uniform flow of seed at the proper rate, and have packer wheels to press the soil firmly over the seed. In lieu of packer wheels, the area will be cultipacked after seeding.

   Install plantings with equipment calibrated to the correct seeding rate and set for the correct depth of planting. Use depth bands if available. Acceptable planters include, but are not limited to, a single-disk, double-disk or furrow drill, hoe drill, or air seeder. Reference NRCS Plant Materials Technical Note MT-30–Calibrating a Drill, dated May 1985.

2. Broadcast Rates. If planting is to be completed by broadcasting the seed—hand planted, mechanical or aerial seeded: (1) seeding rates must be doubled if no other operation will take place after seed broadcasting, or (2) recommended seeding rates may be used–from Montana Conservation Practice Specification 550, TABLE 1–Range Seeding Rates and Mixtures–if the seedbed is roughened, seed broadcast, covered with a spike-tooth harrow or similar implement, and then rolled with a packer or culti-packer.

3. Seed Placement. Native grasses, forbs, and shrubs need to be seeded at a shallow depth, as light plays a key role in the germination of many species. Native grass mixtures that contain varying seed sizes should be planted no deeper than 1/2 to 3/4-inch deep. Drills fitted with depth bands and packer wheels are strongly recommended.

   CAUTION: Many rangeland shrubs (big sagebrush, silver sagebrush, and others) require light for germination and MUST be seeded no deeper than 1/4-inch. Research has shown that if these seeds are mixed with other seeds and

planted deeper than 1/4-inch, the seeding will be a complete failure. Reference NRCS Plant Materials Technical Note MT-31–Restoration of Woody Plants within Native Range Communities, dated June 1999.

When seeding warm season grasses, native forbs with small sized seed, or rangeland shrubs, species must be drill seeded separately in alternate rows, or broadcast on the soil surface and lightly covered, for successful establishment. Another option is two seeding operations with the second operation perpendicular to the first.

4. **Row Spacing. Row spacing for most rangeland mixtures will be between 6 and 14 inches. The minimum row spacing for Basin wildrye is 18 inches. Where row spacings are greater than 12 inches, hazards from wind or water erosion, or weed encroachment may exist and must be managed.**

5. **Slope. Where slopes are greater than five percent, planting will be completed on the contour or across the general slope of the land.**

MANAGEMENT OF NEW PLANTINGS

All range plantings will be protected from domestic grazing from the date of seeding for at least two consecutive growing seasons (April 15 to October 1), or longer if the seeding is not well established at the end of two years. If shrubs are included in the planting, their successful establishment should be used as the criteria for grazing deferment.

A planned grazing system that follows FOTG, Section IV, Practice Standards and Specifications, 528A–Prescribed Grazing will be applied immediately to the planted areas after the establishment deferment period is over.

During the two-year establishment period, excessive amounts of competitive weeds will be controlled by applying herbicides or by clipping. Control weeds that compete with seedlings for sunlight and/or moisture during the growing season of the species planted and initiate clipping when weeds reach a height of six to eight inches. Clipping shall be done before weed seed development, or prior to significant soil moisture competition. Heavy weed infestations should be clipped and removed from the site, while lighter stands can be spread uniformly across the planting site.

Herbicides must be applied very carefully to avoid injuring new seedings. Apply herbicides according to label instructions. See FOTG, Section IV, Practice Standards and Specifications, 595–Pest Management, and *Montana, Utah, Wyoming Weed Management Handbook* for herbicide recommendations.

Additional criteria for improving or maintaining livestock nutrition and/or health

Selection of a species or combination of species shall be designed to meet **site characteristics** and the desired nutritional and palatability requirements for the kind and class of livestock for the intended season of use.

Selection of species or combination of species shall be designed to meet the desired season of use or grazing period. **For example, to extend the green feed period throughout the growing season, plant a mixture of both cool and warm season species. To provide a higher quality diet, plant nonpoisonous native legumes in the mixture.**

Additional criteria for reducing erosion by wind and/or water

When site conditions require erosion protection, seedings shall have the ability to provide adequate ground cover, canopy cover, and root mass to retard wind forces and water flows. Include species in the mixture that exhibit quick establishment to assist with erosion control, such as slender or thickspike wheatgrass.

Conventionally tilled sites may require site preparation with wind strips to maintain the unsheltered distance for erosion control.

Additional criteria for improved water quality and quantity

Select a species or combination of species that will maintain a stable soil surface and increase infiltration.

Additional criteria for improving forage, browse or cover for wildlife

Selection of planted species shall meet dietary and palatability requirements for the intended wildlife species.

Species will be selected and planted in a designed manner that will meet the cover requirements of the wildlife species of concern. **Reference FOTG, Section IV–Practice Standards and Specifications, 645–Upland Wildlife Habitat or 644–Wetland Wildlife Habitat.**

CONSIDERATIONS

Species selected for planting should contribute to wildlife and aesthetics when opportunities exist.

Where wildlife management is an objective, the food and cover value of the planting can be enhanced by using an approved habitat evaluation procedure to aid in selecting plant species and providing for other habitat requirements necessary to achieve the objective.

Additional FOTG, Section IV, Practice Standards and Specifications, 314–Brush Management, 595–Pest Management, or 548–Grazing Land Mechanical Treatment may be needed for satisfactory site preparation to insure a successful range planting.

Consider spring plantings in areas where frequent winter thawing of the soil occurs, as seeds planted during the fall may germinate during the winter and die or the seed will rot.

PLANS AND SPECIFICATIONS

Specifications for the establishment of range plantings shall be prepared for each site or management unit according to the Criteria, Considerations, and Operations and Maintenance described in this standard, and shall be recorded on specification sheets, job sheets, in narrative statements in the conservation plan, or other acceptable documentation.

A range planting plan shall include the following information:

1. **Location map – tract and field numbers and a map or sketch of the area to be planted.**
2. **Measured acres.**
3. **Rangeland inventory information–including ecological sites and similarity index ratings. Information as to pasture or cropland species composition and soil / site condition.**
4. **Date practice is scheduled and applied.**
5. **Planned seedbed preparation and necessary weed control.**
6. **Seeding method and depth of seeding.**
7. **Erosion prediction before and after if primary purpose is for erosion control.**
8. **Mixture and seeding rate (PLS), including selected cultivars.**
9. **Seed inoculation or treatment required.**
10. **Erosion protection provided during establishment period, if needed.**
11. **Prescribed Grazing Plan and other useful comments as to expected forage productivity.**
12. **Date and signature of producer and NRCS.**

The Montana Conservation Practice Specification for Range Planting is required for this practice.

OPERATION AND MAINTENANCE

Operation: Identify any required items needed to assist in stand establishment such as **fallowing to control weeds and store soil moisture,** mowing, burning, or herbicides to control weeds. Address insect and disease control needs through integrated pest management where they are likely to create establishment problems.

Implement a Prescribed Grazing Plan for plantings that will be grazed.

Maintenance: Any necessary replanting due to drought, insects or other uncontrollable event which prevented adequate stand establishment should be addressed as soon as possible. Recommendations may vary from complete re-establishment to interseeding or spot replanting. Thin stands may only need additional grazing deferment during the growing season.

REFERENCES

Calibrating a Drill. USDA–Natural Resources Conservation Service, Plant Materials Technical Note MT-30, May 1985.

Fertilizer Guidelines for Montana. Montana State University, Extension Service Bulletin EB 104, March 1997.

Montana Interagency Plant Materials Handbook. Montana State University Extension Service, EB 69, April 1993.

Montana, Utah, Wyoming Weed Management Handbook, 2001 – 2002. Cooperative Extension Services, April 2001.

Native Grass Seed Production Manual. USDA–Natural Resources Conservation Service, 1996.

Species Selection Criteria for Seeding Dryland Pastures in Montana and Wyoming, Montana. State University Extension Service, EB 19, September 2000.

Restoration of Woody Plants within Native Range Communities. USDA–Natural Resources Conservation Service, Plant Materials Technical Note MT-31, June 1999.

Plant Materials for Acidic/Heavy Metal Contaminated Soils. USDA–Natural Resources Conservation Service, Plant Materials Technical Note MT-32, June 1999.

Tips for Drilling Chaffy Grass Seed: Attention to Detail Essential, Land and Water Magazine, July/August, 1997.

Users Guide to Description, Propagation, and Establishment of Native Shrubs and Trees for Riparian Areas in the Intermountain West. USDA–Natural Resources Conservation Service, Plant Materials Technical Note MT-36, February 2001.

Users Guide to Description, Propagation, and Establishment of Sedges, Rushes, and Grasses for Riparian Areas in the Intermountain West. USDA–Natural Resources Conservation Service, Plant Materials Technical Note MT-37, February 2001.

USDA–Natural Resources Conservation Service, Field Office Technical Guide, Section IIE8–Technical Range Site Descriptions.

Rangeland Resource Unit Map–Montana, July 1993.

USDA Plant Hardiness Zone Map. USDA–ARS, Miscellaneous Publication No. 1475, January 1990.

USDA–Natural Resources Conservation Service, Field Office Technical Guide, Section IV–Conservation Practice Standards:

- 314–Brush Management, February 1985
- 512–Pasture and Hayland Planting, March 1999
- 528A–Prescribed Grazing, August 2000
- 548–Chiseling and Subsoiling, May 1989
- 590–Nutrient Management, June 2000
- 595–Pest Management, August, 2000
- 644–Wetland Wildlife Habitat Management, February 2000
- 645–Upland Wildlife Habitat Management, February 2000